

Inspection Report For Well: UT20736 - 06603

U.S. Environmental Protection Agency
Underground Injection Control Program, 8ENF-T
999 18th Street, Suite 300, Denver, CO 80202-2466

This form was printed on 9/24/2013

INSPECTOR(S): Lead: Roberts, Sarah
Others: Ajayi, Christopher

Date: ¹²10/10/2013
Time: 10:55 am pm

OPERATOR (only if different):

REPRESENTATIVE(S): Chad Stevenson

PRE-INSPECTION REVIEW

Petroglyph Operating Company, Inc

Well Name: Ute Tribal 16-07
Well Type: Enhanced Recovery (2R)
Operating Status: AC (ACTIVE) as of 1/13/2006
Oil Field: Antelope Creek (Duchesne)
Location: SWNE S16 T5N R3W
Indian Country: X, Uintah and Ouray
Last Inspection: 8/28/2012 Allowable Inj Pressure: 1658 /
Last MIT: Pass 1/17/2011 Annulus Pressure From Last MIT: 1040

BLACK = POSSIBLE VIOLATION

GREY = DATA MISSING

INSPECTION TYPE: (Select One)

☐ Construction / Workover
☐ Plugging
☐ Post-Closure

☒ Response to Complaint
☒ Routine
☐ Witness MIT

☐ Other

ICIS Entered

Date 12/20/13

Initials JB

OBSERVED VALUES:

Tubing Gauge: ☒ Yes Pressure: U: 1600 / L: _____ psig Gauge Owner: ☐ EPA
☐ No Gauge Range: Scata _____ psig ☒ Operator

Annulus Gauge: ☒ Yes Pressure: 0 _____ psig Gauge Owner: ☒ EPA
☐ No Gauge Range: opened _____ psig ☐ Operator

Bradenhead Gauge: ☐ Yes Pressure: _____ psig Gauge Owner: ☐ EPA
☐ No Gauge Range: _____ psig ☐ Operator

Pump Gauge: ☐ Yes Pressure: _____ psig Gauge Owner: ☐ EPA
☐ No Gauge Range: _____ psig ☐ Operator

Operating Status: ☒ Active ☐ Not Injecting ☐ Plugged and Abandoned
(Select One) ☐ Being Reworked ☐ Production ☐ Under Construction

U2 Entered

Date 12/17/13 See page 2 for photos, comments, and site conditions.

Initial

JB

GREEN	BLUE	CBI

Inspection Report For Well: UT20736 - 06603 (PAGE 2)

PHOTOGRAPHS:

☐

Yes

☒


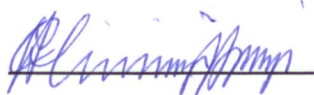
No

List of photos taken: _____

Comments and site conditions observed during inspection: _____

GPS: GPS File ID: _____

Signature of EPA Inspector(s):

☐

Data Entry

☐

Compliance Staff

☐

Hard Copy Filing

NOTICE OF INSPECTION



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII, 999 18TH STREET - SUITE 500
DENVER, COLORADO 80202-2405

Date: 12/10/13

Notice of inspection is hereby given according to Section 1445(b) of the Safe Drinking Water Act (42 U.S.C. §300f et seq.).

Hour: 8:00a

Firm Name: Petroglyph Operating, Inc.

Firm Address: Roosevelt, UT, Antelope Creek Oil Field

REASON FOR INSPECTION:

For the purpose of inspecting records, files, papers, processes, controls and facilities, and obtaining samples to determine whether the person subject to an applicable underground injection control program has acted or is acting in compliance with the Safe Drinking Water Act and any applicable condition of permit or rule authorization.

SECTION 1445(b) of the SAFE DRINKING WATER ACT is quoted below:

Section 1445(b)(1): Except as provided in Paragraph (2), the Administrator, or representatives of the Administrator duly designated by him, upon presenting appropriate credentials, and a written notice to any supplier of water or other person subject to (a), or person subject (A) a national primary drinking water regulation prescribed under Section 1412(B) an applicable Underground Injection Control Program, or (C) any requirement to monitor an unregulated contaminant pursuant to subsection (a), or person in charge of any of the property of such supplier or other person referred to in clause (A), (B), or (C), is authorized to enter any establishment, ... facility, or other property of such supplier or other person in order to determine whether such supplier or other person has acted or is acting in compliance with this title, including for this purpose, inspection, at reasonable times, of records, files, papers, processes, controls, and facilities, or in order to test any feature of a public water system, including its raw water source. The Administrator or the Comptroller General (or any representative designated by either) shall have access for the purpose of audit and examination to any records, reports, or information of a grantee which are required to be maintained under subsection (a) or which are pertinent to any financial assistance under this title.

Sarah Roberts

Inspector's Name & Title (Print)

[Signature]
Inspector's Signature



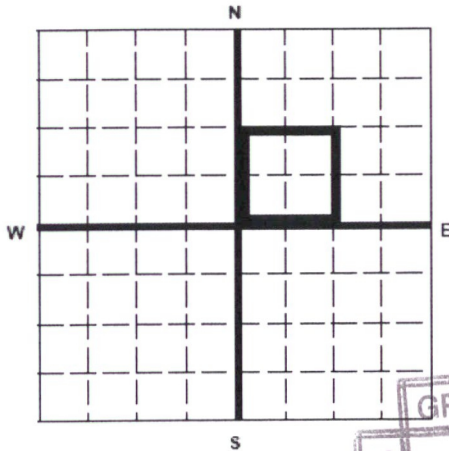
United States Environmental Protection Agency
Washington, DC 20460

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

Name and Address of Existing Permittee
Petroglyph Operating Company, Inc. 2258
P.O. Box 7608
Boise, Idaho 83709

Name and Address of Surface Owner
Ute Indian Tribe
P.O. Box 70
Ft. Duchesne, Utah, 84026

Locate Well and Outline Unit on
Section Plat - 640 Acres



State
Utah

County
Duchesne

Permit Number
UT2736-06603

Surface Location Description

1/4 of 1/4 of SW 1/4 of NE 1/4 of Section 16 Township 5S Range 3W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location 2091 ft. from (N/S) N Line of quarter section
and 2094 ft. from (E/W) W Line of quarter section.

WELL ACTIVITY

- ☐ Brine Disposal
☒ Enhanced Recovery
☐ Hydrocarbon Storage

TYPE OF PERMIT

- ☐ Individual
☒ Area
Number of Wells 111

U2 Entered

Date 4/3/17

Initial DS

Lease Name Ute Indian Tribe

Well Number UTE TRIBAL 16-07

INJECTION PRESSURE

TOTAL VOLUME INJECTED

TUBING - CASING ANNULUS PRESSURE
(OPTIONAL MONITORING)

MONTH	YEAR	AVERAGE PSIG	MAXIMUM PSIG	BBL	MCF	MINIMUM PSIG	MAXIMUM PSIG
January	16	1688	1718	2558		0	0
February	16	1723	1759	2513		0	0
March	16	1727	1751	2642		0	0
April	16	1798	1812	3126		0	0
May	16	1793	1840	3142		0	0
June	16	1814	1837	3202		0	0
July	16	1820	1854	3365		0	0
August	16	1825	1847	3459		0	0
September	16	1800	1828	3105		0	0
October	16	1770	1772	2835		0	0
November	16	1754	1786	2645		0	0
December	16	1782	1799	3040		0	0

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

Chad Stevenson, Water Facilities Supervisor

Signature

Date Signed

03/21/2017

Multi-Chem Analytical Laboratory

1553 East Highway 40

Vernal, UT 84078

Units of Measurement: **Standard**

multi-chem®

A HALLIBURTON SERVICE

Water Analysis Report

Production Company: **PETROGLYPH OPERATING CO INC - EBUS**
 Well Name: **PETROGLYPH UT TRIBAL 16-07 DUCHESNE**
 Sample Point: **Well Head**
 Sample Date: **1/6/2017**
 Sample ID: **WA-345295**

Sales Rep: **James Patry**
 Lab Tech: **Kaitlyn Natelli**

Scaling potential predicted using ScaleSoftPitzer from
 Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
		Cations	mg/L	Anions	mg/L
Test Date:	1/25/2017	Sodium (Na):	4397.90	Chloride (Cl):	5500.00
System Temperature 1 (°F):	300	Potassium (K):	31.32	Sulfate (SO4):	0.00
System Pressure 1 (psig):	2000	Magnesium (Mg):	9.50	Bicarbonate (HCO3):	2440.00
System Temperature 2 (°F):	130	Calcium (Ca):	25.78	Carbonate (CO3):	
System Pressure 2 (psig):	50	Strontium (Sr):	5.23	Hydroxide (HO):	
Calculated Density (g/ml):	1.0059	Barium (Ba):	34.65	Acetic Acid (CH3COO)	
pH:	8.40	Iron (Fe):	8.76	Propionic Acid (C2H5COO)	
Calculated TDS (mg/L):	12486.60	Zinc (Zn):	0.37	Butanoic Acid (C3H7COO)	
CO2 in Gas (%):		Lead (Pb):	0.00	Isobutyric Acid ((CH3)2CHCOO)	
Dissolved CO2 (mg/L):	0.00	Ammonia NH3:		Fluoride (F):	
H2S in Gas (%):		Manganese (Mn):	0.21	Bromine (Br):	
H2S in Water (mg/L):	0.00	Aluminum (Al):	2.18	Silica (SiO2):	32.88
Tot. Suspended Solids (mg/L):		Lithium (Li):	3.31	Calcium Carbonate (CaCO3):	
Corrosivity (Langlier Sat. Indx)	0.00	Boron (B):	5.47	Phosphates (PO4):	4.75
Alkalinity:		Silicon (Si):	15.37	Oxygen (O2):	

Notes:

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO4 2H2O		Celestite SrSO4		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
130.00	50.00	1.39	21.23	0.00	0.00	0.00	0.00	3.05	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149.00	267.00	1.45	21.38	0.00	0.00	0.00	0.00	3.14	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
168.00	483.00	1.51	21.56	0.00	0.00	0.00	0.00	3.22	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
187.00	700.00	1.59	21.73	0.00	0.00	0.00	0.00	3.31	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
206.00	917.00	1.67	21.90	0.00	0.00	0.00	0.00	3.39	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
224.00	1133.00	1.77	22.04	0.00	0.00	0.00	0.00	3.46	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
243.00	1350.00	1.87	22.15	0.00	0.00	0.00	0.00	3.54	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262.00	1567.00	1.98	22.25	0.00	0.00	0.00	0.00	3.60	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
281.00	1783.00	2.09	22.33	0.00	0.00	0.00	0.00	3.66	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	2000.00	2.21	22.39	0.00	0.00	0.00	0.00	3.72	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

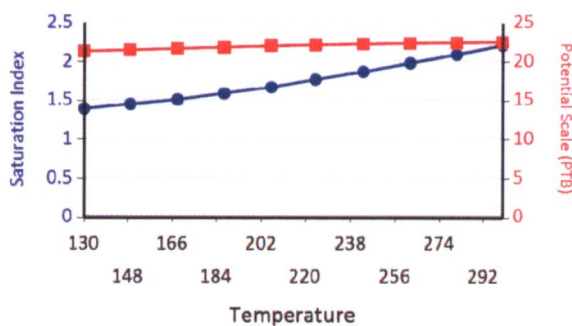
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ ~0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
130.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.23	0.00	0.00	3.21	15.33	1.83	16.82	11.14	6.81
149.00	267.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	0.24	0.00	0.00	3.92	16.73	2.21	19.59	11.55	6.81
168.00	483.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63	0.24	0.00	0.00	4.66	17.71	2.61	22.59	12.03	6.81
187.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	0.25	0.00	0.00	5.39	18.28	3.02	25.24	12.51	6.81
206.00	917.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.25	0.00	0.00	6.12	18.60	3.44	27.32	13.01	6.81
224.00	1133.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	0.25	0.00	0.00	6.83	18.77	3.85	28.66	13.51	6.81
243.00	1350.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	0.25	0.00	0.00	7.53	18.87	4.25	29.31	14.01	6.81
262.00	1567.00	0.00	0.00	0.00	0.00	0.00	0.00	2.31	0.25	0.00	0.00	8.21	18.92	4.65	29.55	14.51	6.81
281.00	1783.00	0.00	0.00	0.00	0.00	0.00	0.00	2.39	0.25	0.00	0.00	8.87	18.95	5.04	29.63	15.01	6.81
300.00	2000.00	0.00	0.00	0.00	0.00	0.00	0.00	2.47	0.25	0.00	0.00	9.51	18.96	5.42	29.66	15.49	6.81

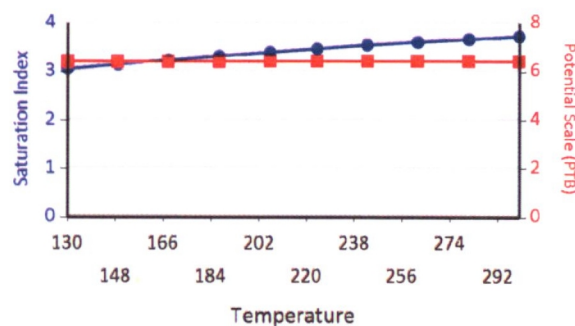
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Iron Carbonate Zinc Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Iron Carbonate Zinc Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

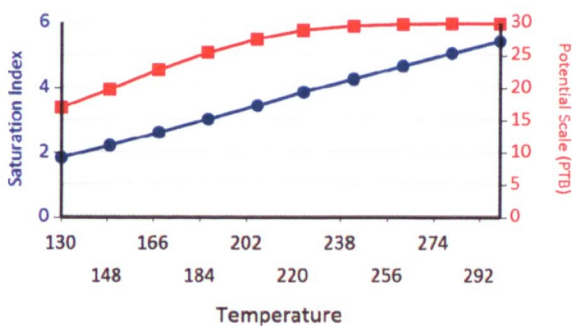
Calcium Carbonate



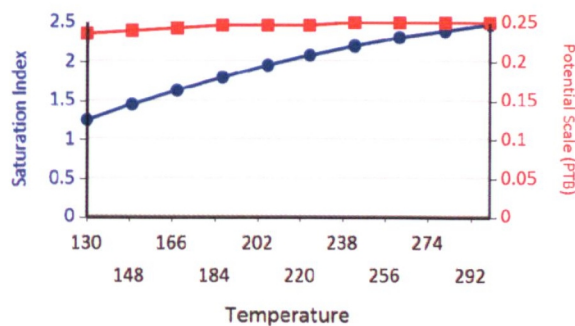
Iron Carbonate



Ca Mg Silicate

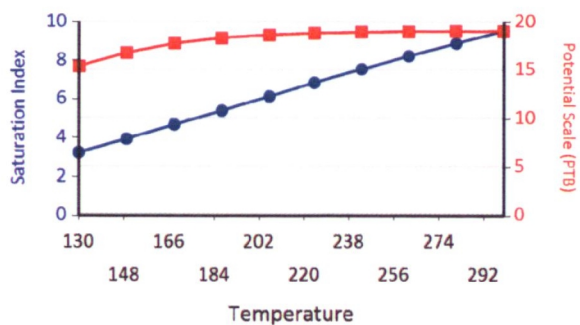


Zinc Carbonate

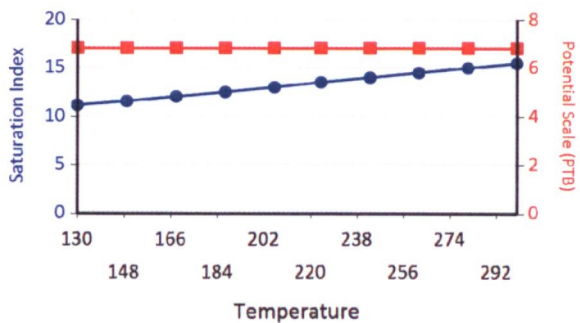


Water Analysis Report

Mg Silicate



Fe Silicate





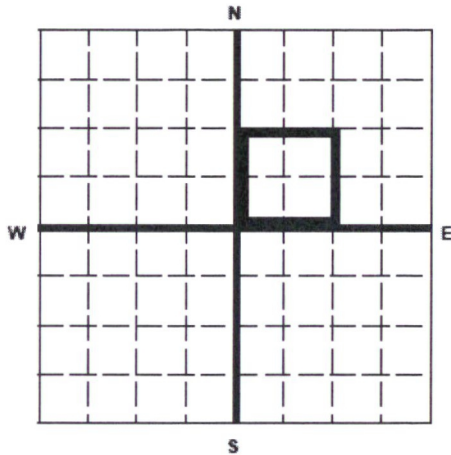
United States Environmental Protection Agency
Washington, DC 20460

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

Name and Address of Existing Permittee
Petroglyph Operating Company, Inc. 2258
P.O. Box 7608
Boise, Idaho 83709

Name and Address of Surface Owner
Ute Indian Tribe
P.O. Box 70
Ft. Duchesne, Utah, 84026

Locate Well and Outline Unit on
Section Plat - 640 Acres



State Utah County Duchesne Permit Number UT2736-04434-06603

Surface Location Description

1/4 of 1/4 of SW 1/4 of NE 1/4 of Section 16 Township 5S Range 3W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location 2091 ft. from (N/S) N Line of quarter section
and 2094 ft. from (E/W) W Line of quarter section.

U2 Entered

WELL ACTIVITY

- ☐ Brine Disposal
☒ Enhanced Recovery
☐ Hydrocarbon Storage

TYPE OF PERMIT

- ☐ Individual
☒ Area

Date 3/1/16

Initial 87

Number of Wells 111

Lease Name Ute Indian Tribe Well Number UTE TRIBAL 16-07

INJECTION PRESSURE				TOTAL VOLUME INJECTED		TUBING - CASING ANNULUS PRESSURE (OPTIONAL MONITORING)	
MONTH	YEAR	AVERAGE PSIG	MAXIMUM PSIG	BBL	MCF	MINIMUM PSIG	MAXIMUM PSIG
January	15	1526	1551	2004		0	0
February	15	1528	1547	1922		0	0
March	15	1570	1600	2087		0	0
April	15	1541	1591	1707		0	0
May	15	1585	1600	1919		0	0
June	15	1575	1606	1752		0	0
July	15	1579	1590	1798		0	0
August	15	1537	1595	1433		0	0
September	15	1542	1542	1938		0	0
October	15	1612	1924	3268		0	0
November	15	1511	1520	1602		0	0
December	15	1604	1707	2385		0	0

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

Chad Stevenson, Water Facilities Supervisor

Signature

Chad Stevenson

Date Signed

02/08/2016

GREEN BLUE CBT

TAB 2

Water Analysis Report

Production Company: PETROGLYPH OPERATING CO INC - EBUS
 Well Name: PETROGLYPH UT TRIBAL 16-07 DUCHESNE
 Sample Point: Well Head
 Sample Date: 1/6/2016
 Sample ID: WA-327701

Sales Rep: James Patry
 Lab Tech: Michele Pike

Scaling potential predicted using ScaleSoftPitzer from
 Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
		Cations	mg/L	Anions	mg/L
Test Date:	1/14/2016	Sodium (Na):	1900.64	Chloride (Cl):	2500.00
System Temperature 1 (°F):	60	Potassium (K):	3.27	Sulfate (SO ₄):	390.00
System Pressure 1 (psig):	2000	Magnesium (Mg):	72.26	Bicarbonate (HCO ₃):	1098.00
System Temperature 2 (°F):	180	Calcium (Ca):	153.27	Carbonate (CO ₃):	
System Pressure 2 (psig):	50	Strontium (Sr):	4.65	Acetic Acid (CH ₃ COO)	
Calculated Density (g/ml):	1.0016	Barium (Ba):	0.33	Propionic Acid (C ₂ H ₅ COO)	
pH:	7.70	Iron (Fe):	3.73	Butanoic Acid (C ₃ H ₇ COO)	
Calculated TDS (mg/L):	6154.70	Zinc (Zn):	0.88	Isobutyric Acid ((CH ₃) ₂ CHCOO)	
CO ₂ in Gas (%):		Lead (Pb):	0.54	Fluoride (F):	
Dissolved CO ₂ (mg/L):	60.00	Ammonia NH ₃ :		Bromine (Br):	
H ₂ S in Gas (%):		Manganese (Mn):	0.07	Silica (SiO ₂):	27.06
H ₂ S in Water (mg/L):	0.00	Aluminum (Al):	0.06	Calcium Carbonate (CaCO ₃):	
Tot. Suspended Solids (mg/L):		Lithium (Li):	0.78	Phosphates (PO ₄):	6.42
Corrosivity (Langlier Sat. Indx)	0.00	Boron (B):	0.22	Oxygen (O ₂):	
Alkalinity:		Silicon (Si):	12.65		

Notes:

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO ₄ ·2H ₂ O		Celestite SrSO ₄		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
180.00	50.00	1.63	102.93	0.30	0.10	0.00	0.00	2.17	2.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167.00	267.00	1.48	94.12	0.32	0.10	0.00	0.00	2.00	2.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153.00	483.00	1.38	88.00	0.35	0.11	0.00	0.00	1.87	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	700.00	1.28	81.80	0.39	0.12	0.00	0.00	1.75	2.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127.00	917.00	1.19	75.64	0.44	0.13	0.00	0.00	1.62	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113.00	1133.00	1.11	69.65	0.51	0.14	0.00	0.00	1.50	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	1350.00	1.03	63.93	0.58	0.14	0.00	0.00	1.38	2.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87.00	1567.00	0.96	58.60	0.68	0.15	0.00	0.00	1.26	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73.00	1783.00	0.89	53.72	0.79	0.16	0.00	0.00	1.14	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60.00	2000.00	0.83	49.35	0.91	0.17	0.00	0.00	1.02	2.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

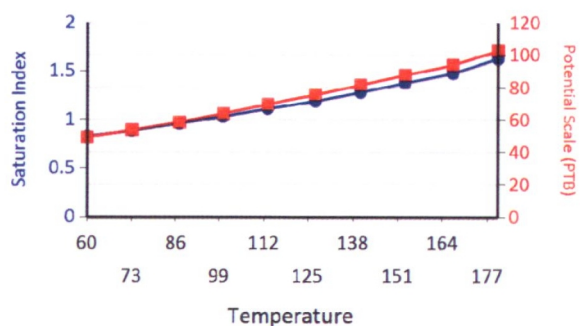
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ ~0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
180.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.57	0.00	0.00	4.83	47.01	2.56	23.18	8.18	2.90
167.00	267.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.56	0.00	0.00	3.80	34.58	1.92	16.81	7.31	2.89
153.00	483.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.54	0.00	0.00	3.02	25.96	1.46	12.30	6.70	2.88
140.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.52	0.00	0.00	2.25	17.97	0.99	8.02	6.10	2.86
127.00	917.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.47	0.00	0.00	1.47	10.87	0.54	4.12	5.51	2.84
113.00	1133.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.40	0.00	0.00	0.70	4.76	0.08	0.66	4.93	2.81
100.00	1350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.28	0.00	0.00	0.00	0.00	0.00	0.00	4.37	2.76
87.00	1567.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	3.81	2.68
73.00	1783.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.27	2.57
60.00	2000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.75	2.42

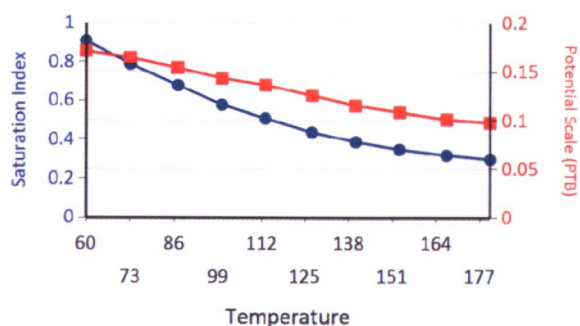
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Barium Sulfate Iron Carbonate Zinc Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Barium Sulfate Iron Carbonate Fe Silicate

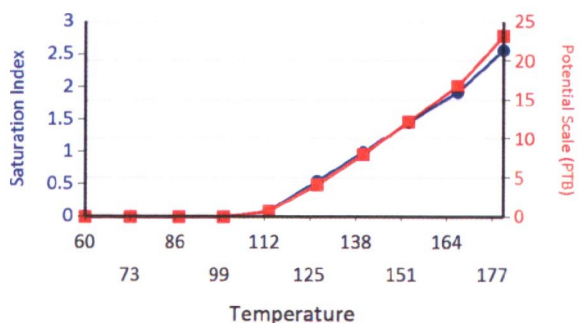
Calcium Carbonate



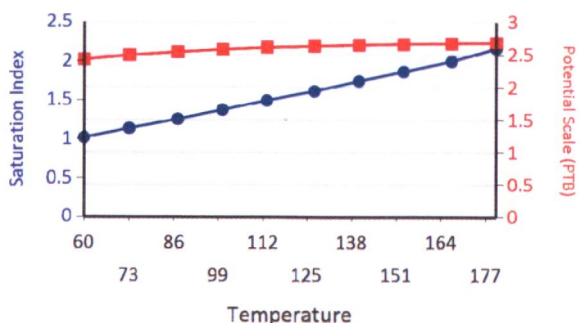
Barium Sulfate



Ca Mg Silicate

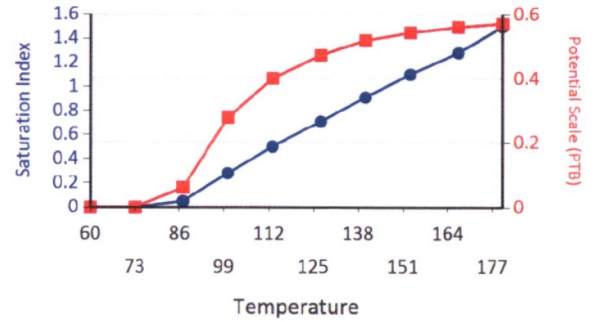


Iron Carbonate

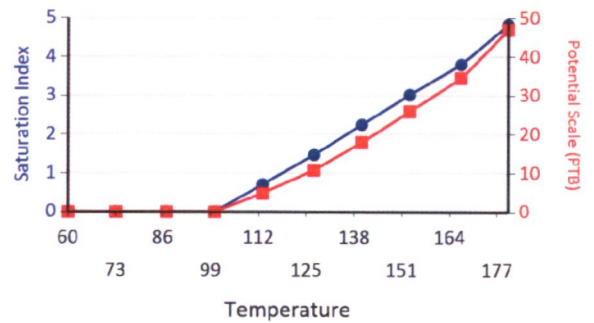


Water Analysis Report

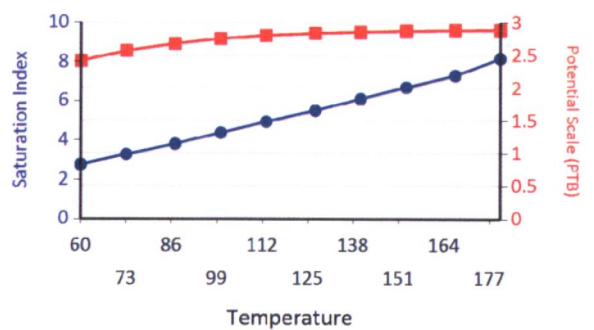
Zinc Carbonate



Mg Silicate



Fe Silicate



Step Rate Test (SRT) Analysis

Date: 11/05/2015

Operator: Petroglyph

Well: Ute Tribal 16-07

Permit #: UT20736-06603

BLUE #1

Surface fracture pressure (P_{fp}) 1910 psi

Depth to top perf (D_{perf}) 4528 feet

$$FG = \frac{P_{fp}}{D_{perf}} + 0.433$$

Fracture Gradient (FG) 0.855 psi/feet

Specific Gravity (SG) 1.001 g/cc

$$MAIP = FG - (0.433 * SG) * D_{perf}$$

Specific Gravity from annual monitoring reports	
FY2014	0.999
FY2013	0.999
FY2012	0.999
FY2011	1.000
FY2010	1.002
FY2009	1.001
FY2008	1.003
FY2007	1.004
FY2007	1.003
MEDIAN	1.001

Maximum Allowable Injection Pressure calculated to top perforation (MAIP)* 1909 psig

Maximum Allowable Injection Pressure, calculated to top perforation (MAIP), 1905 psig

*MAIP is calculated to top of perforation, not top of injection zone (set at 4070'). If operator adds shallower perfs, MAIP will need recalculation to shallower depths.

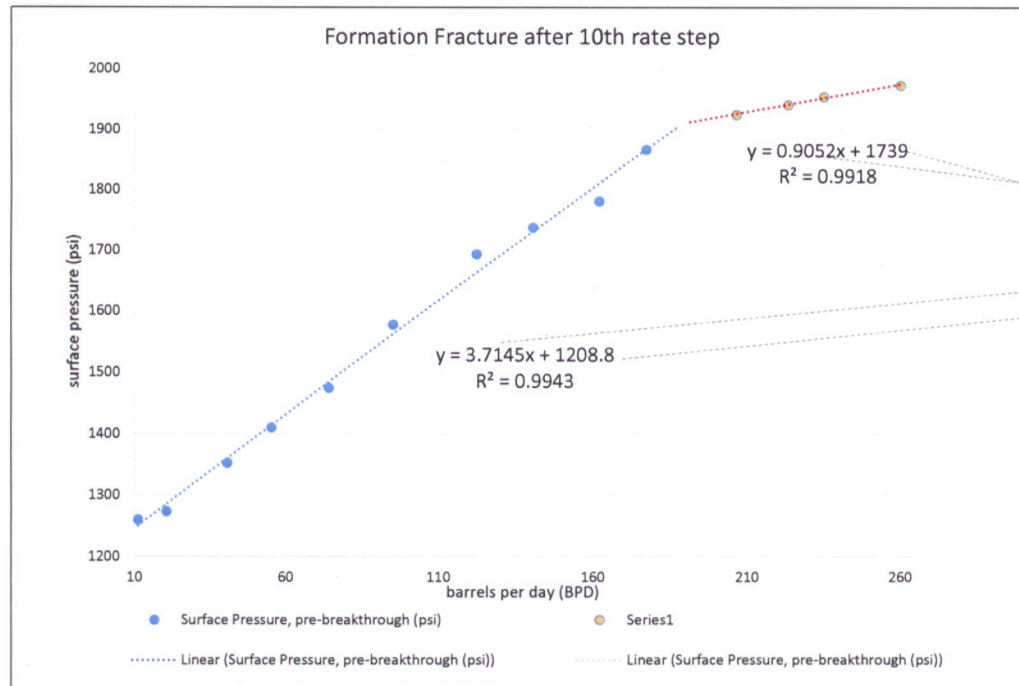
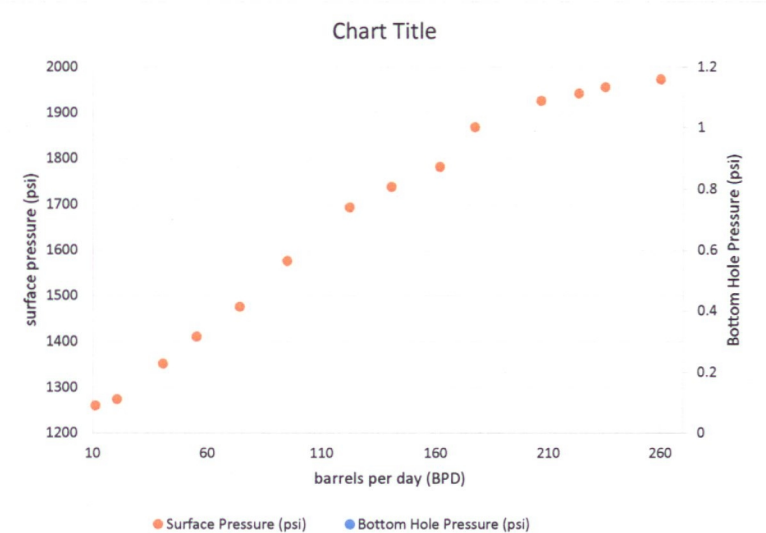
EPA's Verifaicon of Step Rate Test Analysis

Well name: **Ute Tribal 16-07**
Permit number: **UT20736-06603**

Instructions:

- 1) Enter verified Rate and Pressure data into table
- 2) Look at scatter plot to left and determine rate step where formation fracture seems to occur.
 - a) If this point is obvious, enter the m and b values from trendlines on corresponding chart below into table (cell D18) to solve for P_{fp}.
 - b) If this point is not obvious, enter the two values for R² off the charts that represent possible data fits in column L. Look at the R² summary table to determine which results in the best fit (Sum R² value closest to 2.0). Then enter the m and b values from the trendlines on table to determine which results in the best fit Sum R² value
- 3) P_{fp} value is automatically entered onto SRT analysis tab. Enter sg, Depth to top perf, and ISIP on that tab to solve for FG (and MAIP).

Rate (bpd)	Bottom Hole Pressure (psi)	Surface Pressure (psi)
1	11.2	1260
2	20.6	1273.6
3	40.7	1352.2
4	55.3	1410.4
5	74.1	1474.7
6	95.1	1577.4
7	122.3	1693.8
8	140.6	1737.9
9	162	1781.1
10	177.2	1866.8
11	206.5	1924.9
12	223.3	1940.7
13	235	1954.4
14	260	1973



Resulting Formation Parting Pressure

For the graph that results in the best fit (Sum R² value closest to 2.0), Enter the following values from the two linear equations to solve for P_{fp}.
(linear equations in form y = mx + b)

→ m₁ = 0.9052
→ b₁ = 1739
→ m₂ = 3.7145
→ b₂ = 1208.8

P_{fp} = 1910 psi

BPD @ P_{fp} based on pre-breakthrough trendline 189.0
BPD @ P_{fp} based on post-breakthrough trendline 189.0

Wang, Gary

From: Rodrigo Jurado <rjurado@pgei.com>
Sent: Wednesday, October 28, 2015 11:46 AM
To: Wang, Gary
Cc: Breffle, Don
Subject: Petroglyph Operating 16-07 Step Rate Test & 29-12 Follow-Up
Attachments: Ute Tribal 16-07 SRT Letter.pdf; Ute Tribal 16-07 Step Rate Test 2015-10.xlsx; Ute Tribal 16-07 Step Rate Test Summary & Analysis.pdf

Good Morning Gary,

I wanted to give you a head's up, we've performed a step rate test on another one of our enhanced recovery wells. The results look good and Petroglyph is requesting an increase of MAIP. The results of the test, a summary and analysis, and a formal request for the pressure increase have been mailed to your office. Copies of these documents are also attached. Please review them at your convenience and let us know if there is any additional action needed on our part. Also, since we are on the subject of Step Rate Tests; we haven't received an approval letter for our revised MAIP on our Ute Tribal 29-12, Permit# UT2736-04523. Would you be able to e-mail me a PDF of the approval letter with the revised MAIP? We'd like to return that well to injection as soon as possible. Again, please let me know if you need any additional info regarding either of these wells and we'll do our best to get you what you need. I hope all is well for you and your team and hope you have a great rest of your week.

Regards,

Rodrigo Jurado
Petroglyph Operating Company, Inc.
Regulatory Compliance Specialist
P.O. BOX 607
Roosevelt, UT 84066
OFFICE: (435) 722-5302
MOBILE: (435) 609-3239
FAX: (435) 722-9145

The contents of this e-mail and any attachments are intended solely for the use of the named addressee(s) and may contain confidential and/or privileged information. Any unauthorized use, copying, disclosure, or distribution of the contents of this e-mail or attachments is strictly prohibited and may be unlawful. If you are not the intended recipient, please notify the sender immediately and destroy all copies of the communication and any attachments.

RECEIVED

NOV 04 2015

Office of Enforcement, Compliance
and Environmental Justice (UFO)

October 28, 2015

Gary Wang
Mail Code: 8ENF-UFO
US EPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

RE: EPA AREA PERMIT NO. UT20736-06603
Change of maximum surface injection pressure
Ute Tribal 16-07 SWNE Sec. 16-T5S-R3W, Duchesne County, Utah

Mr. Wang:

On October 3, 2015 Petroglyph Operating Company performed a step rate test on the Ute Tribal 16-07, EPA Permit # UT20736-06603. Petroglyph is requesting that the maximum surface injection pressure be increased from 1,658 psig to 1,909 psig. Please review the enclosed materials which includes a spreadsheet containing data recorded using our injection monitoring system, and a summary and analysis of the step rate test.

If you need any more information please call at (435) 722-5302.

Sincerely,
Petroglyph Operating Co., Inc.



Rodrigo Jurado
Regulatory Compliance Specialist

Encl: SRT Summary and Analysis, SRT XLS File

Step Rate Test

UT 16-07 Injector

Antelope Creek Field

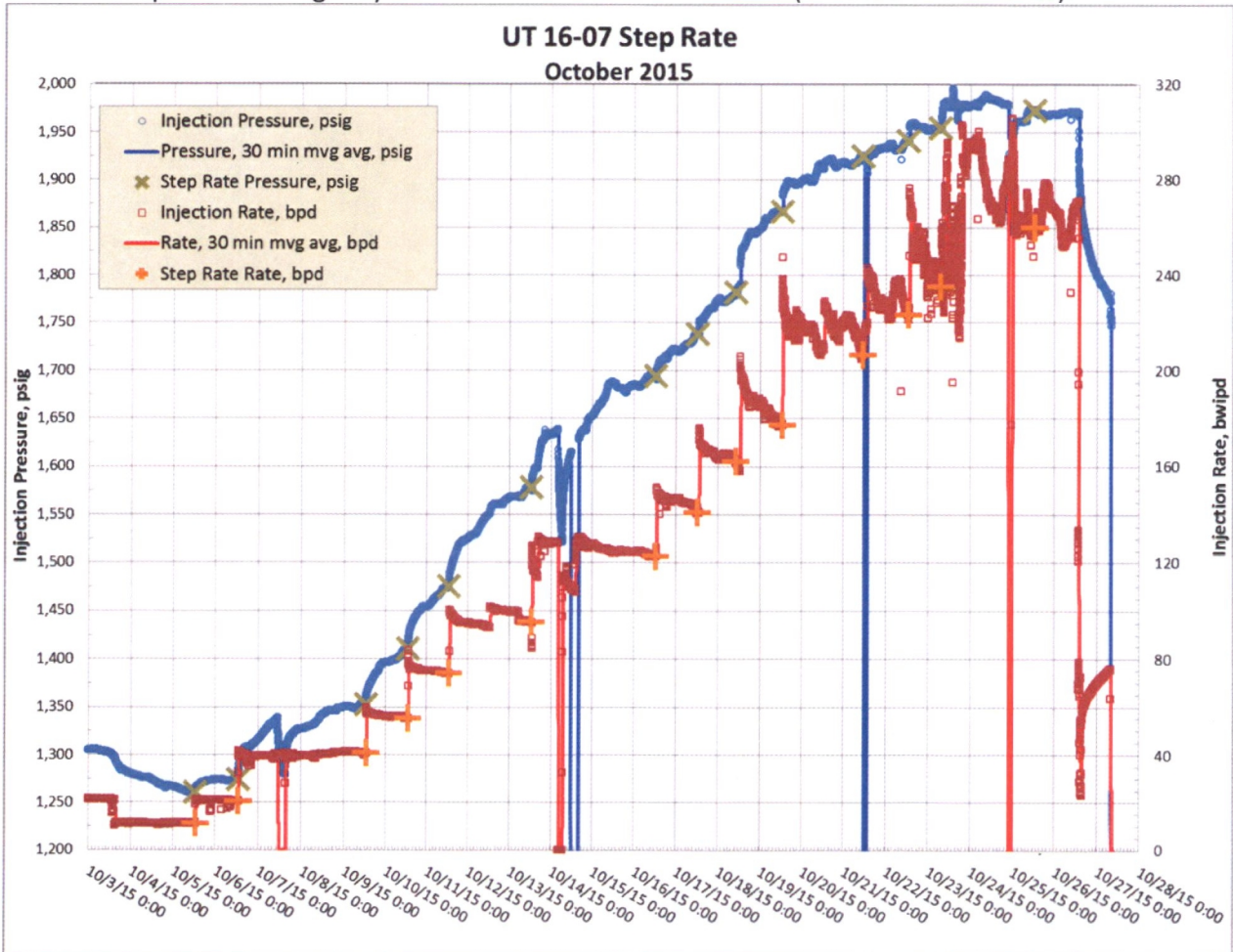
Duchesne County, UT

EPA Permit #: UT2736-06603

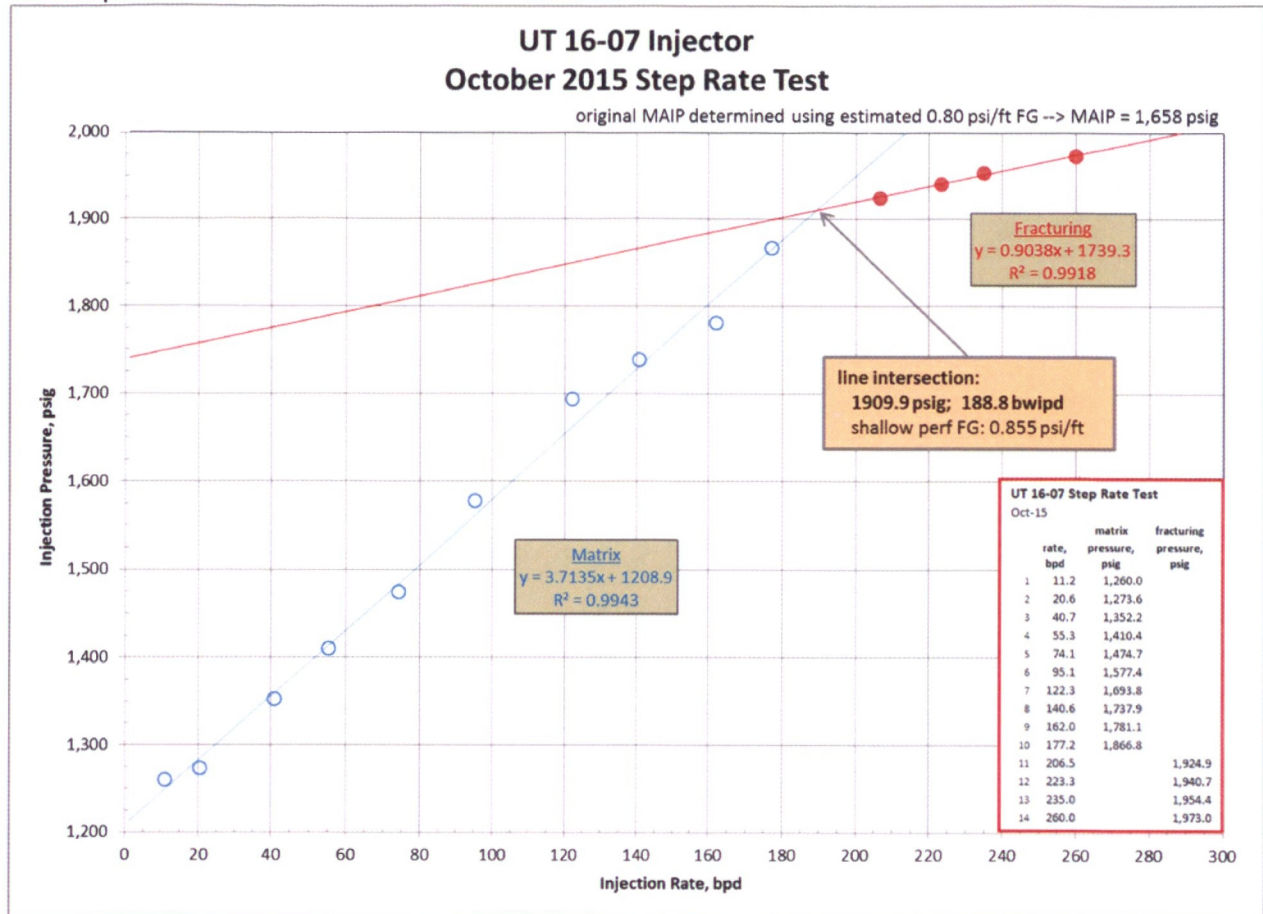
On October 3, 2015, Petroglyph Energy began a step rate test on the UT 16-07 Injector. This well has a Maximum Allowable Injection Pressure (MAIP) of 1,658 psig which was set based on a 0.80 psi/ft fracturing gradient to the top perforation at 4,528'. This step rate was run to determine the actual fracturing gradient.

The step rate test was performed from October 3-26, 2015. We have good digital data points with matrix and fracturing lines having $R^2 > 0.99$, indicating a good test. In general, each step was 24 hours in length, although we extended a couple tests, when we had interruptions in the test.

A Cartesian plot of the digitally recorded Halliburton meter data (1 minute increments):



The Step Rate chart:



The resultant step rate plot indicates a fracturing point intersection at:

1,909 psig

188 bwipd

FG: 0.855 psi/ft - to the top perf

Based on this test, we believe the MAIP should be adjusted upwards to 1,909 psig.

A spreadsheet with the data and graphs is enclosed.

Kevin Dickey

VP Operations

Petroglyph Energy, Inc.

960 Broadway Ave, Boise, ID 83706

o. 208.685.7654

m. 208.841.5354



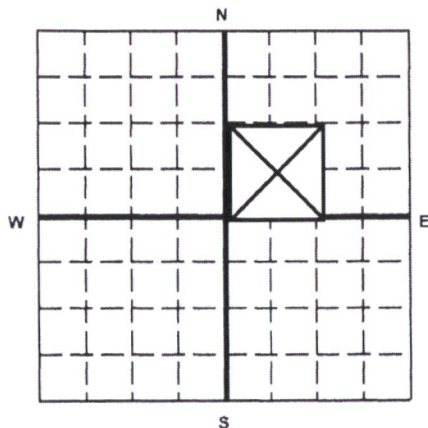
United States Environmental Protection Agency
Washington, DC 20460

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

Name and Address of Existing Permittee
Petroglyph Operating Company, Inc. 2258
P.O. Box 7608
Boise, Idaho 83709

Name and Address of Surface Owner
Ute Indian Tribe
P.O. Box 70
Ft. Duchesne, Utah 84026

Locate Well and Outline Unit on
Section Plat - 640 Acres



State
Utah

County
Duchesne

Permit Number
UT2736-06603

Surface Location Description

1/4 of 1/4 of SW 1/4 of NE 1/4 of Section 16 Township 5S Range 3W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location 2091 ft. from (N/S) N Line of quarter section
and 2094 ft. from (E/W) W Line of quarter section.

WELL ACTIVITY

- ☐ Brine Disposal
☒ Enhanced Recovery
☐ Hydrocarbon Storage

TYPE OF PERMIT

- ☐ Individual
☒ Area

Number of Wells 111

Lease Name Ute Indian Tribe

Well Number UTE TRIBAL 16-07

TUBING -- CASING ANNULUS PRESSURE
(OPTIONAL MONITORING)

		INJECTION PRESSURE		TOTAL VOLUME INJECTED			
MONTH	YEAR	AVERAGE PSIG	MAXIMUM PSIG	BBL	MCF	MINIMUM PSIG	MAXIMUM PSIG
January	14	1548	1580	2327		0	0
February	14	1581	1593	2304		0	0
March	14	1559	1567	2467		0	0
April	14	1578	1595	2842		0	0
May	14	1588	1593	2949		0	0
June	14	1555	1589	2394		0	0
July	14	1535	1585	1942		0	0
August	14	1566	1606	2005	1816 inj monthly	0	0
September	14	1546	1599	1890		0	0
October	14	1526	1557	1940		0	0
November	14	1534	1570	2012		0	0
December	14	1554	1580	2205		0	0

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

Chad Stevenson, Water Facilities Supervisor

Signature

Date Signed

2/10/2015

U2 Entered
Date 2/27/15
Initial CW

	GREEN	BLUE	GBI
TAB		2	

Multi-Chem Analytical Laboratory

1553 East Highway 40

Vernal, UT 84078

multi-chem®

A HALLIBURTON SERVICE

Units of Measurement: Standard

Water Analysis Report

Production Company: PETROGLYPH
 Well Name: Ute Tribal 16-07 Inj
 Sample Point: Well
 Sample Date: 1/7/2015
 Sample ID: WA-298483

Sales Rep: James Patry
 Lab Tech: Gary Winegar

Scaling potential predicted using ScaleSoftPitzer from
 Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
Test Date:	1/21/2015	Cations		Anions	
		mg/L		mg/L	
System Temperature 1 (°F):	160	Sodium (Na):	432.17	Chloride (Cl):	1000.00
System Pressure 1 (psig):	1300	Potassium (K):	7.96	Sulfate (SO4):	395.00
System Temperature 2 (°F):	80	Magnesium (Mg):	66.15	Bicarbonate (HCO3):	976.00
System Pressure 2 (psig):	15	Calcium (Ca):	134.13	Carbonate (CO3):	
Calculated Density (g/ml):	0.9992	Strontium (Sr):	4.21	Acetic Acid (CH3COO)	
pH:	8.00	Barium (Ba):	0.96	Propionic Acid (C2H5COO)	
Calculated TDS (mg/L):	3064.11	Iron (Fe):	14.71	Butanoic Acid (C3H7COO)	
CO2 in Gas (%):		Zinc (Zn):	5.04	Isobutyric Acid ((CH3)2CHCOO)	
Dissolved CO2 (mg/L):	24.00	Lead (Pb):	0.07	Fluoride (F):	
H2S in Gas (%):		Ammonia NH3:		Bromine (Br):	
H2S in Water (mg/L):	5.00	Manganese (Mn):	0.10	Silica (SiO2):	27.61

Notes:

B=1.32 Al=0 Li=4

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO4·2H2O		Celestite SrSO4		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
80.00	14.00	1.48	72.38	1.59	0.56	3.78	4.54	2.36	10.62	0.00	0.00	0.00	0.00	0.00	0.00	11.53	2.63
88.00	157.00	1.44	69.24	1.51	0.55	3.66	4.54	2.37	10.62	0.00	0.00	0.00	0.00	0.00	0.00	11.31	2.63
97.00	300.00	1.47	71.03	1.43	0.55	3.62	4.54	2.42	10.63	0.00	0.00	0.00	0.00	0.00	0.00	11.16	2.63
106.00	443.00	1.50	72.93	1.36	0.55	3.58	4.54	2.48	10.64	0.00	0.00	0.00	0.00	0.00	0.00	11.02	2.63
115.00	585.00	1.53	74.94	1.30	0.54	3.55	4.54	2.54	10.64	0.00	0.00	0.00	0.00	0.00	0.00	10.89	2.63
124.00	728.00	1.56	77.03	1.24	0.54	3.53	4.54	2.59	10.65	0.00	0.00	0.00	0.00	0.00	0.00	10.77	2.63
133.00	871.00	1.60	79.19	1.19	0.54	3.51	4.54	2.65	10.66	0.00	0.00	0.00	0.00	0.00	0.00	10.66	2.63
142.00	1014.00	1.63	81.40	1.14	0.53	3.51	4.54	2.70	10.66	0.00	0.00	0.00	0.00	0.00	0.00	10.55	2.63
151.00	1157.00	1.67	83.64	1.10	0.53	3.51	4.54	2.76	10.67	0.00	0.00	0.00	0.00	0.00	0.00	10.46	2.63
160.00	1300.00	1.71	85.89	1.07	0.52	3.51	4.54	2.81	10.67	0.00	0.00	0.00	0.00	0.00	0.00	10.37	2.63

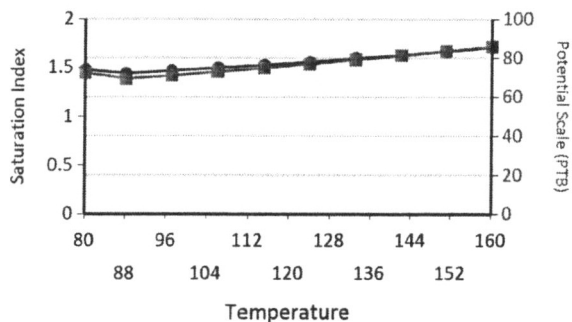
		Hemihydrate CaSO4~0.5H2O		Anhydrate CaSO4		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
80.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	3.18	11.94	0.03	0.98	4.39	0.23	1.12	7.57	11.21
88.00	157.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	3.21	11.61	0.03	1.08	4.55	0.24	1.10	7.50	11.17
97.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	1.48	3.26	11.35	0.03	1.51	6.62	0.48	2.17	7.77	11.23
106.00	443.00	0.00	0.00	0.00	0.00	0.00	0.00	1.61	3.29	11.11	0.03	1.95	8.91	0.73	3.32	8.06	11.28
115.00	585.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73	3.32	10.89	0.03	2.41	11.42	0.98	4.55	8.36	11.31
124.00	728.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	3.33	10.68	0.03	2.87	14.12	1.24	5.85	8.67	11.34
133.00	871.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	3.35	10.48	0.03	3.33	16.98	1.50	7.19	8.99	11.37
142.00	1014.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	3.36	10.29	0.03	3.80	19.91	1.76	8.56	9.32	11.38
151.00	1157.00	0.00	0.00	0.00	0.00	0.00	0.00	2.18	3.36	10.12	0.03	4.27	22.80	2.03	9.91	9.65	11.40
160.00	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	2.29	3.37	9.95	0.03	4.74	25.50	2.30	11.20	9.99	11.41

Water Analysis Report

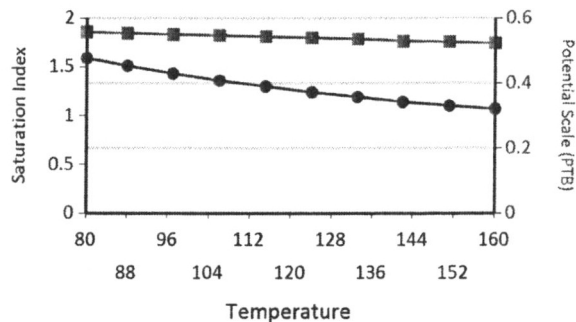
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Barium Sulfate Iron Sulfide Iron Carbonate Zinc Sulfide Zinc Carbonate Lead Sulfide Mg Silicate Ca Mg Silicate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Barium Sulfate Iron Sulfide Iron Carbonate Zinc Sulfide Zinc Carbonate Lead Sulfide Mg Silicate Ca Mg Silicate Fe Silicate

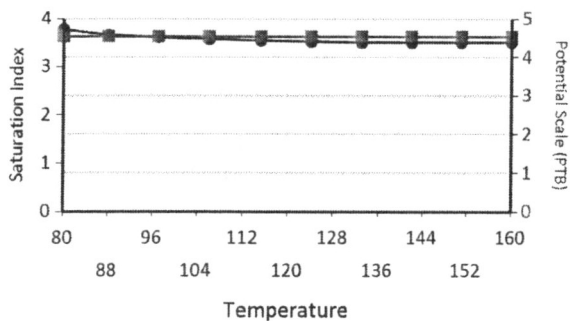
Calcium Carbonate



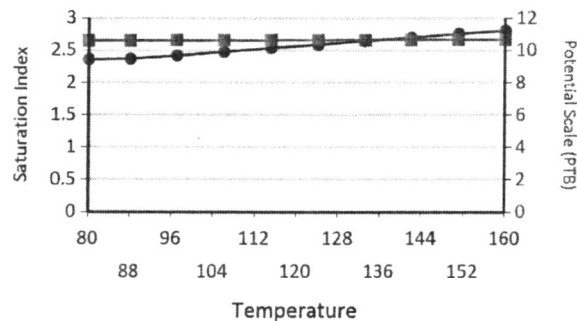
Barium Sulfate



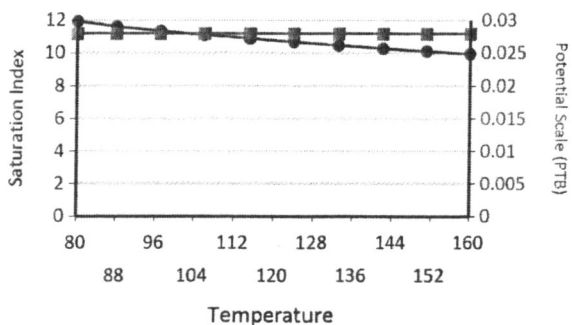
Iron Sulfide



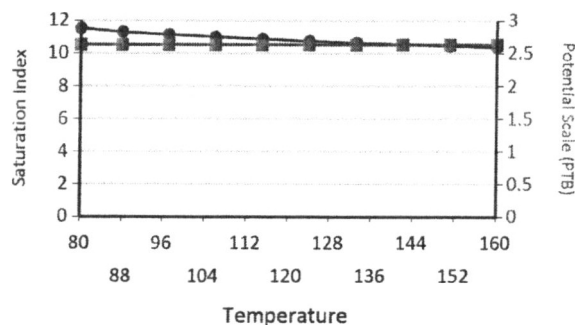
Iron Carbonate



Lead Sulfide

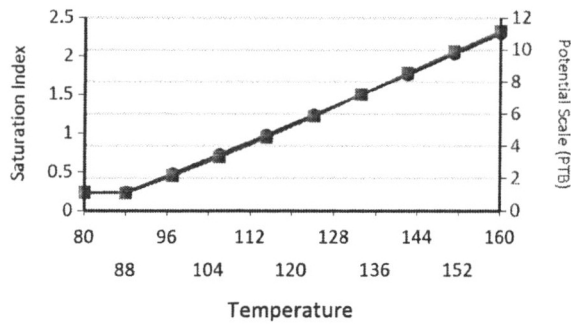


Zinc Sulfide

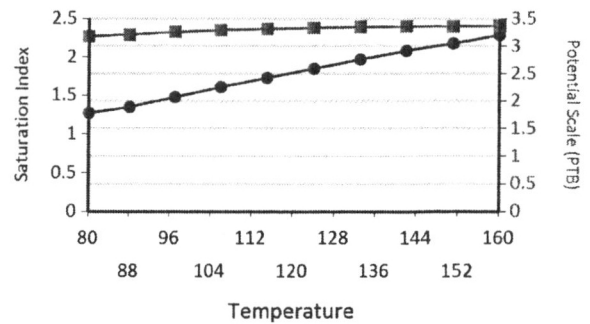


Water Analysis Report

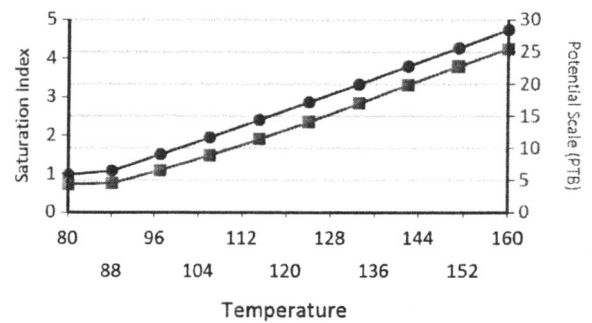
Ca Mg Silicate



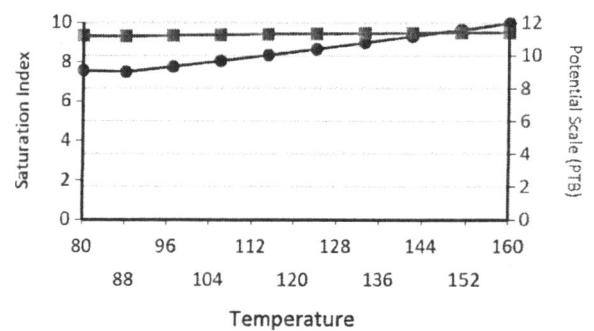
Zinc Carbonate



Mg Silicate



Fe Silicate





United States Environmental Protection Agency
Washington, DC 20460

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

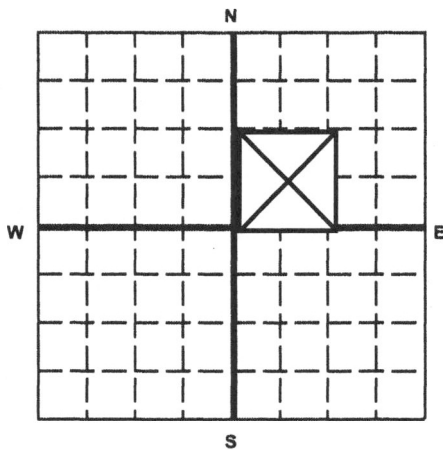
Name and Address of Existing Permittee

Petroglyph Operating Company, Inc. 2258
P.O. Box 7608
Boise, Idaho 83709

Name and Address of Surface Owner

Ute Indian Tribe
P.O. Box 70
Ft. Duchesne, Utah 84026

Locate Well and Outline Unit on
Section Plat - 640 Acres



State
Utah

County
Duchesne

Permit Number
UT2736-06603

Surface Location Description

1/4 of 1/4 of SW 1/4 of NE 1/4 of Section 16 Township 5S Range 3W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location 2091 ft. from (N/S) N Line of quarter section
and 2094 ft. from (E/W) W Line of quarter section.

WELL ACTIVITY

- ☐ Brine Disposal
☒ Enhanced Recovery
☐ Hydrocarbon Storage

TYPE OF PERMIT

- ☐ Individual
☒ Area

Number of Wells 111

Lease Name Ute Indian Tribe

Well Number UTE TRIBAL 16-07

		INJECTION PRESSURE		TOTAL VOLUME INJECTED		TUBING -- CASING ANNULUS PRESSURE (OPTIONAL MONITORING)	
MONTH	YEAR	AVERAGE PSIG	MAXIMUM PSIG	BBL	MCF	MINIMUM PSIG	MAXIMUM PSIG
January	13	1565	1589	778		0	0
February	13	1577	1611	691		0	0
March	13	1591	1604	679		0	0
April	13	1593	1607	583		0	0
May	13	1597	1618	461		0	0
June	13	1596	1607	404		0	0
July	13	1580	1599	445		0	0
August	13	1521	1546	1497		0	0
September	13	1547	1577	2018		0	0
October	13	1540	1561	2205		0	0
November	13	1558	1609	2479		0	0
December	13	1584	1602	2358		0	0

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

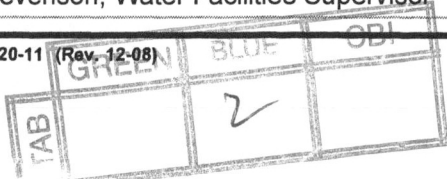
Chad Stevenson, Water Facilities Supervisor

Signature

Chad Stevenson

Date Signed

2/11/2014



Date

3/18/14

Initial

DS

Multi-Chem Analytical Laboratory

1553 East Highway 40

Vernal, UT 84078

Units of Measurement: Standard

multi-chem®

A HALLIBURTON SERVICE

Water Analysis Report

Production Company: PETROGLYPH ENERGY INC

Well Name: UTE TRIBAL 16-07 INJ

Sample Point: Wellhead

Sample Date: 1/8/2014

Sample ID: WA-263372

Sales Rep: James Patry

Lab Tech: Gary Winegar

Scaling potential predicted using ScaleSoftPitzer from
Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
Test Date:		Cations		Anions	
1/8/2014		mg/L		mg/L	
System Temperature 1 (°F):	180	Sodium (Na):	262.00	Chloride (Cl):	1000.00
System Pressure 1 (psig):	1300	Potassium (K):	9.90	Sulfate (SO ₄):	386.00
System Temperature 2 (°F):	60	Magnesium (Mg):	69.00	Bicarbonate (HCO ₃):	732.00
System Pressure 2 (psig):	15	Calcium (Ca):	151.00	Carbonate (CO ₃):	
Calculated Density (g/ml):	0.999	Strontium (Sr):	3.90	Acetic Acid (CH ₃ COO)	
pH:	8.00	Barium (Ba):	0.63	Propionic Acid (C ₂ H ₅ COO)	
Calculated TDS (mg/L):	2641.85	Iron (Fe):	3.80	Butanoic Acid (C ₃ H ₇ COO)	
CO ₂ in Gas (%):		Zinc (Zn):	0.00	Isobutyric Acid ((CH ₃) ₂ CHCOO)	
Dissolved CO ₂ (mg/L):	0.00	Lead (Pb):	0.00	Fluoride (F):	
H ₂ S in Gas (%):		Ammonia NH ₃ :		Bromine (Br):	
H ₂ S in Water (mg/L):	0.00	Manganese (Mn):	0.08	Silica (SiO ₂):	23.54

Notes:

B=.81 Al=.03 Li=.11

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO ₄ ·2H ₂ O		Celestite SrSO ₄		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
60.00	14.00	1.34	55.13	1.64	0.37	0.00	0.00	1.48	2.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73.00	157.00	1.33	53.95	1.49	0.36	0.00	0.00	1.53	2.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86.00	300.00	1.37	56.74	1.36	0.36	0.00	0.00	1.62	2.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	443.00	1.41	59.90	1.25	0.35	0.00	0.00	1.71	2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113.00	585.00	1.46	63.38	1.15	0.35	0.00	0.00	1.80	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126.00	728.00	1.52	67.15	1.07	0.34	0.00	0.00	1.89	2.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	871.00	1.58	71.15	1.00	0.34	0.00	0.00	1.98	2.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153.00	1014.00	1.64	75.34	0.95	0.33	0.00	0.00	2.07	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166.00	1157.00	1.71	79.66	0.90	0.33	0.00	0.00	2.16	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180.00	1300.00	1.78	84.07	0.86	0.32	0.00	0.00	2.24	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

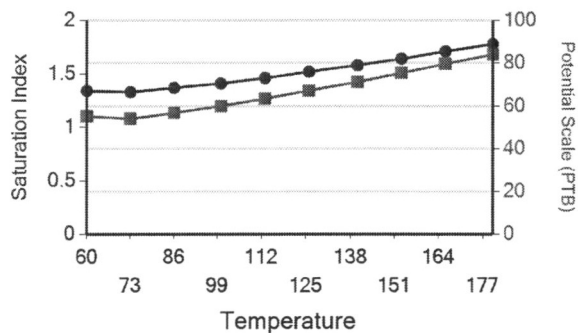
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ •0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
60.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.93	2.81
73.00	157.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.79	0.00	0.00	5.04	2.83
86.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	2.87	0.11	0.42	5.44	2.86
100.00	443.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.57	5.34	0.49	1.70	5.88	2.89
113.00	585.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.26	8.25	0.87	3.15	6.34	2.91
126.00	728.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.96	11.58	1.27	4.75	6.82	2.92
140.00	871.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.67	15.26	1.68	6.46	7.32	2.93
153.00	1014.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.39	19.04	2.09	8.19	7.83	2.94
166.00	1157.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	22.51	2.50	9.85	8.35	2.95
180.00	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.81	25.23	2.90	11.31	8.87	2.95

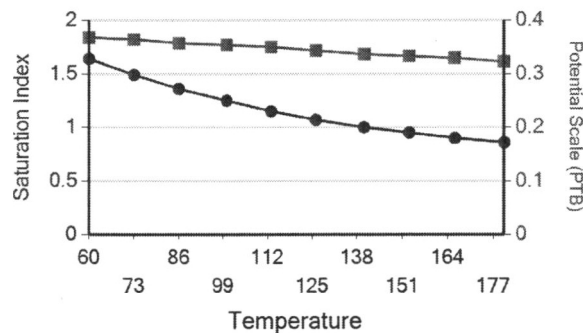
These scales have positive scaling potential under initial temperature and pressure: Calcium Carbonate Barium Sulfate Iron Carbonate Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Barium Sulfate Iron Carbonate Mg Silicate Ca Mg Silicate Fe Silicate

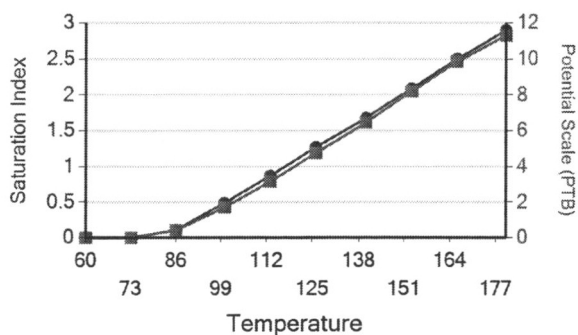
Calcium Carbonate



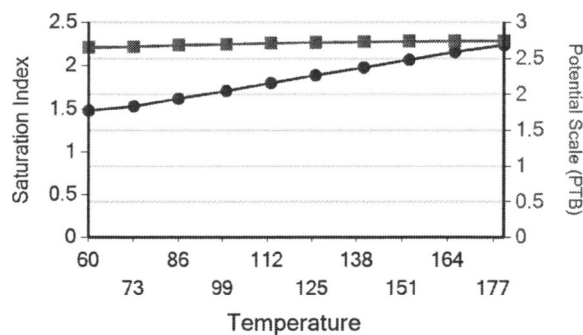
Barium Sulfate



Ca Mg Silicate

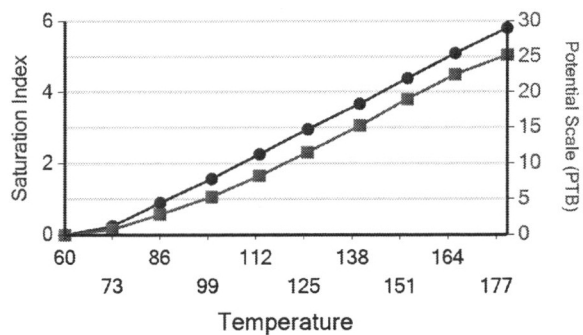


Iron Carbonate

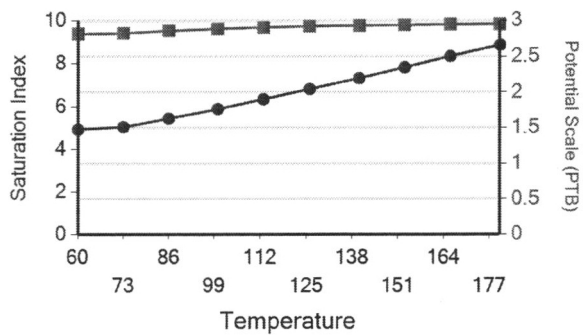


Water Analysis Report

Mg Silicate



Fe Silicate





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
<http://www.epa.gov/region08>

NOV 23 2015

Ref: 8P-W-UIC

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

	GREEN	BLUE	CBI
TAB		3	

Rodrigo Jurado, Regulatory Compliance Specialist
Petroglyph Operating Company, Inc.
4116 West 3000 South Ioka Lane
P.O. Box 2653
Roosevelt, Utah 84066

Re: Underground Injection Control (UIC): Change in Maximum Allowable Injection Pressure on the Ute Tribal 7-15 Well (EPA Well # UT20736-06603, API # 43-013-31854) - Antelope Creek Oil Field, Duchesne County, Utah

Dear Mr. Jurado:

On October 28, 2015, the Environmental Protection Agency received a letter from Petroglyph Operating Company, Inc. (Petroglyph) requesting a proposed change of the maximum allowable surface injection pressure (MAIP) for the above-referenced well. The proposed change in the MAIP included results from a step rate test performed from October 3, 2015 to October 26, 2015. The results of the step rate test indicated a fracture gradient of 0.855 pounds per square inch per foot (psi/ft). The EPA has reviewed your request and concurs with the determined fracture gradient value.

Pursuant to Part II, Section C.5.b of the above referenced permit, the EPA hereby revises the MAIP for the Ute Tribal 16-07 injection well to not exceed 1,905 psig. The determination is based on the following calculation, rounded down to an integer of five:

$$\text{MAIP} = [\text{FG} - (0.433)(\text{SG})] * \text{Depth}$$

Where:

FG = 0.855 psi/feet (ft.) (from the step rate test)

SG = 1.001 (the median specific gravity from annual fluid analysis results)


Depth = 4,528 ft. (top perforation depth KB)

If in the future the well is perforated at any depth more shallow than the current top perforation of 4,528 feet, the MAIP must be recalculated to reflect to the shallowest perforated depth.

Failure to comply with a UIC permit or the UIC regulations found at 40 C.F.R. Parts 144 and 146 constitute one or more violations of the Safe Drinking Water Act, 42 U.S.C. § 300h-2. Such non-compliance may subject you to formal enforcement by the EPA, as codified at 40 C.F.R. Part 22.

If you have any questions concerning this letter, you may contact Gary Wang at (303) 312-6469. Please direct all correspondence to the attention of Gary Wang at Mail Code 8ENF-UFO.

Sincerely,



Darcy O'Connor
Acting Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc:

Uintah & Ouray Business Committee

Honorable Shaun Chapoose, Chairman
Edred Secakuku, Vice-Chairman
Reannin Tapoof, Executive Assistant

Bartholomew Stevens, Superintendent
BIA - Uintah & Ouray Indian Agency

Bart Powaukee
Environmental Director
Ute Indian Tribe

Minnie Grant
Air Quality Coordinator
Ute Indian Tribe

Bruce Pargeets
Assistant Director of Energy & Minerals Dept.
Ute Indian Tribe

Brad Hill
Utah Division of Oil, Gas, and Mining

Robin Hansen
Fluid Minerals Engineering Office
BLM - Vernal Office

7009 3410 0000 2600 2679

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OFFICIAL USE

Postage	\$	Postmark Here
Certified Fee		
Return Receipt Fee (Endorsement Required)		
Restricted Delivery Fee (Endorsement Required)		

Total Paid **Rodrigo Jurado**
Petroglyph Operating Company, Inc.

Sent To	
Street, Apt. or PO Box	4116 W 3000 S Ioka Lane
City, State	P.O. Box 607 Roosevelt, UT 84066

PS Form 3800, August 2006 See Reverse for Instructions

Resent 12/11/15

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

DEC 14 2015

Rodrigo Jurado
Petroglyph Operating Company, Inc.
4116 W 3000 S Ioka Lane
P.O. Box 607
Roosevelt, UT 84066

COMPLETE THIS SECTION ON DELIVERY

A. Signature **X** *Melissa Kead* ☐ Agent
☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
 If YES, enter delivery address below: ☐ No

DEC 18 2015

3. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Certified Mail | <input type="checkbox"/> Express Mail |
| <input type="checkbox"/> Registered | <input type="checkbox"/> Return Receipt for Merchandise |
| <input type="checkbox"/> Insured Mail | <input type="checkbox"/> C.O.D. |

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number
 (Transfer from service label)

7009 3410 0000 2600 2679

PS Form 3811, February 2004

Domestic Return Receipt

102595-02-M-1540

bcc: Randy Brown (8P-TA)
Kimberly Pardue-Welch (8ENF-W)
Gary Wang (8ENF-UFO)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
<http://www.epa.gov/region08>

Ref: 8P-W-UIC

CONCURRENCE

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Rodrigo Jurado, Regulatory Compliance Specialist
Petroglyph Operating Company, Inc.
4116 West 3000 South Ioka Lane
P.O. Box 2653
Roosevelt, Utah 84066

Re: Underground Injection Control (UIC): Change in Maximum Allowable Injection Pressure on the Ute Tribal 7-15 Well (EPA Well # UT20736-06603, API # 43-013-31854) - Antelope Creek Oil Field, Duchesne County, Utah

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[Signature]
8P-W-UIC
11/16/15

[Signature]
8P-W-UIC
11/16/15

[Signature]
8P-W-UIC
11/18/2015

[Signature]
8P-W-UIC
11/18/15

[Signature]
Clatibone
8P-W-UIC

[Signature]
8P-W
11/19/15

If you have any questions concerning this letter, you may contact Gary Wang at (303) 312-6469. Please direct all correspondence to the attention of Gary Wang at Mail Code 8ENF-UFO.

Sincerely,

Darcy O'Connor

cc:

Uintah & Ouray Business Committee

Honorable Shaun Chapoose, Chairman
Edred Secakuku, Vice-Chairman
Reannin Tapoof, Executive Assistant

Bartholomew Stevens, Superintendent
BIA - Uintah & Ouray Indian Agency

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Fluid Minerals Engineering Office
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Concurrence Copy

NOV 23 2015

Ref: 8P-W-UIC

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Rodrigo Jurado, Regulatory Compliance Specialist
Petroglyph Operating Company, Inc.
4116 West 3000 South Ioka Lane
P.O. Box 2653
Roosevelt, Utah 84066

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If you have any questions concerning this letter, you may contact Gary Wang at (303) 312-6469. Please direct all correspondence to the attention of Gary Wang at Mail Code 8ENF-UFO.

Sincerely,

31 /SIGNED/

Darcy O'Connor
Acting Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc:

Uintah & Ouray Business Committee

Honorable Shaun Chapoose, Chairman
Edred Secakuku, Vice-Chairman
Reannin Tapoof, Executive Assistant

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Fluid Minerals Engineering Office
BLM - Vernal Office



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
<http://www.epa.gov/region08>

AUTHORIZATION FOR ADDITIONAL WELL

UIC Area Permit No: UT20736-00000

The Antelope Creek Waterflood Final UIC Area Permit No. UT20736-00000, effective July 12, 1994, authorizes injection for the purpose of enhanced oil recovery into multiple lenticular sand units which are distributed throughout the lower portion of the Green River Formation. On May 8, 2000, the permittee provided notice to the Director concerning the following additional enhanced recovery injection well:

Well Name:	<u>Ute Tribal 16-07</u>
EPA Well ID Number:	<u>UT20736-06603</u>
Location:	2091 ft FNL & 2094 ft FEL SW NE Sec. 16 - T5S - R3W Duchesne County, Utah.

Pursuant to 40 CFR §144.33, Area UIC Permit No. UT20736-00000 authorizes the permittee to construct and operate, convert, or plug and abandon additional enhanced recovery injection wells within the area permit. This well was determined to satisfy additional well criteria required by the permit.

This well is subject to all provisions of UIC Area Permit No. UT20736-00000, as modified and as specified in the Well Specific Requirements detailed below. This Authorization shall expire one year after the Effective Date unless the permittee has converted the well to injection or submits a written request to extend this Authorization prior to the expiration date.

This Authorization is effective upon signature.

Date: 10-14-05


Stephen S. Tuber

*Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

** The person holding this title is referred to as the Director throughout the Permit and Authorization*



WELL-SPECIFIC REQUIREMENTS

Well Name: Ute Tribal 16-07
EPA Well ID Number: UT20736-06603

Prior to commencing injection operations, the permittee shall submit the following information and receive written Authority to Inject from the Director:

1. a successful Part I (Internal) Mechanical Integrity test (MIT);
2. pore pressure calculation of the proposed injection zone; and
3. completed Well Rework Record EPA Form No. 7520-12 and schematic diagram.

Approved Injection Zone: Injection is approved between the base of the Green River A Lime Marker, at approximately 4070 ft, to the top of the Basal Carbonate, at approximately 6020 ft.

Maximum Allowable Injection Pressure (MAIP): The initial MAIP is **1658 psig**, based on the following calculation:

MAIP = $[FG - (0.433)(SG)] * D$, where

FG = 0.80 psi/ft SG = 1.002 D = **4528 ft** (top perforation depth KB)

MAIP = **1658 psi**

UIC Area Permit No. UT20736-00000 also provides the opportunity for the permittee to request a change of the MAIP based upon results of a step rate test that demonstrates the formation breakdown pressure will not be exceeded.

Well Construction and Corrective Action: ***The following Corrective Action is required.***

Based on the review of well construction and the cement bond log, well construction may not prevent significant fluid movement through vertical channels adjacent to the injection well bore, Part II (External) Mechanical Integrity (Part II MI), pursuant to standards of REGION 8 GROUND WATER SECTION GUIDANCE NO. 34 "*Cement Bond Logging Techniques and Interpretation.*" Therefore the operator shall demonstrate Part II MI prior to commencing injection and at least once every five years thereafter using a temperature survey, noise log, oxygen activation log, or a radioactive tracer survey under certain circumstances. If necessary, the Director may authorize a limited period for injection prior to the test to allow for stabilization of the injection formation prior to the test.

Tubing 2-3/8" or similar size injection tubing is approved; the packer shall be set at
and Packer: a depth no more than 100 ft above the top perforation.

Corrective Action for Wells in Area of Review: ***No Corrective Action is required.*** The following wells that penetrate the confining zone are within or proximate to a 1/4 mile radius around the Ute Tribal No. 16-07 were evaluated to determine if any corrective action is necessary to prevent fluid movement into USDWs:

Well: Ute Tribal No. 16-06	Location: SE NW Sec. 16 - T5S - R3W
Well: Ute Tribal No. 16-08	Location: SE NE Sec. 16 - T5S - R3W

Demonstration of Mechanical Integrity: A successful demonstration of Part I (Internal) Mechanical Integrity using a standard Casing-Tubing pressure test is required prior to injection and at least once every five years thereafter. EPA reviewed the cement bond log and determined the cement may not provide an effective barrier to significant upward movement of fluids through vertical channels adjacent to the well bore pursuant to 40 CFR 146.8 (a)(2). Therefore, further demonstration of Part II (External) Mechanical Integrity is required within 180 days after commencing injection and at least once every five years thereafter.

Demonstration of Financial Responsibility: The applicant has demonstrated financial responsibility via a Surety Bond that has been reviewed and approved by the EPA.

Plugging and Abandonment: The well shall be plugged in a manner that isolates the injection zone and prevents movement of fluids into or between USDWs. Tubing, packers, and any downhole apparatus shall be removed. Class A, C, G, and H cements, with additives such as accelerators and retarders that control or enhance cement properties, may be used for plugs; however, volume extending additives and gel cements are not approved for plug use. Plug placement shall be verified by tagging. Plugging gel of at least 9.2 lb/gal shall be placed between all plugs. A minimum 50 ft surface plug shall be set inside and outside of the surface casing to seal pathways for fluid migration into the subsurface. Within sixty (60) days after plugging the owner or operator shall submit Plugging Record (EPA Form 7520-13) to the Director. The Plugging Record must be certified as accurate and complete by the person responsible for the plugging operation. At a minimum, the following plugs are required:

- PLUG NO. 1: Set a cast iron bridge plug (CIBP) no more than 50 ft above the top perforation at 4528 ft with a minimum 20 ft cement plug on top of the CIBP.
- PLUG NO. 2: Set a minimum 210 ft cement plug inside of the 5-1/2" casing across the Trona Zone and the Mahogany Shale, between approximately 2840 ft to 3050 ft.
- PLUG NO. 3: Set a minimum 200 ft cement plug inside of the 5-1/2" casing across the Green River, between approximately 1568 ft to 1768 ft.
- PLUG NO. 4: Set a minimum 200 ft cement plug on the backside of the 5-1/2" casing, across the Green River, between approximately 1568 ft to 1768 ft.
- PLUG NO. 5: Set a minimum 50 ft cement plug on the backside of the 5-1/2" casing, across the surface casing shoe at 270 ft (unless pre-existing backside cement precludes cement-squeezing this interval.)
- PLUG NO. 6: Set a cement plug inside of the 5-1/2" casing, from at least 295 ft to 245 ft.
- PLUG NO. 7: Set a cement plug on the backside of the 5-1/2" casing, from surface to a depth of at least 50 ft.
- PLUG NO. 8: Set a cement plug inside of the 5-1/2" casing from surface to a depth of at least 50 ft.

Cut off surface and 5-1/2" casing at least 4 ft below ground level and set P&A marker; submit Sundry Notices and all necessary data as required by the EPA and other regulatory agencies.

Reporting of Noncompliance:

- (a) Anticipated Noncompliance. The operator shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (b) Compliance Schedules. Reports of compliance or noncompliance with, or any progress on, interim and final requirements contained in any compliance schedule of this Permit shall be submitted no later than thirty (30) days following each schedule date.
- (c) Written Notice of any noncompliance which may endanger health or the environment shall be reported to the Director within five (5) days of the time the operator becomes aware of the noncompliance. The written notice shall contain a description of the noncompliance and its cause; the period of noncompliance including dates and times; if the noncompliance has not been corrected the anticipated time it is expected to continue; and steps taken or planned to prevent or reduce recurrence of the noncompliance.

Twenty-Four Hour Noncompliance Reporting:

The operator shall report to the Director any noncompliance which may endanger health or environment. Information shall be provided, either orally or by leaving a message, within twenty-four (24) hours from the time the operator becomes aware of the circumstances by telephoning 1.800.227-8917 and asking for the EPA Region 8 UIC Program Compliance and Enforcement Director, or by contacting the Region 8 Emergency Operations Center at 303.293.1788 if calling from outside EPA Region 8. The following information shall be included in the verbal report:

- (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW.
- (b) Any noncompliance with a Permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

Oil Spill and Chemical Release Reporting:

The operator shall comply with all other reporting requirements related to oil spills and chemical releases or other potential impacts to human health or the environment by contacting the **National Response Center (NRC) 1.800.424.8802 or 202.267.2675**, or through the NRC website at **<http://www.nrc.uscg.mil/index.htm>**.

Other Noncompliance:

The operator shall report all other instances of noncompliance not otherwise reported at the time monitoring reports are submitted.

Other Information:

Where the operator becomes aware that he failed to submit any relevant facts in the Permit application, or submitted incorrect information in a Permit application, or in any report to the Director, the operator shall submit such correct facts or information within two (2) weeks of the time such information became known to him.

WELL-SPECIFIC CONSIDERATIONS

Well Name: **Ute Tribal 16-07**

EPA Well ID Number: **UT20736-00000**

Underground Sources of Drinking Water (USDWs): USDWs in the Antelope Creek Waterflood area generally may occur within the Uinta Formation, which extends from the surface to the top of the Green River Formation at approximately 1700 ft. According to "*Base of Moderately Saline Ground Water in the Uinta Basin, Utah, State of Utah Technical Publication No. 92,*" the base of moderately saline ground water may be found at approximately 88 ft below ground surface at this well location. Petroglyph Energy, Inc. provided documentation stating that the base of the USDW was found at 1230 ft KB. Based on analysis of the submitted cement bond log (CBL) the top of casing cement in this well is at approximately ft (KB).

Confining Zone: The Confining Zone at this location is approximately 206 ft of interbedded limestone and shale between the depths of 3850 ft to 4070 ft (KB) which directly overlies the Injection Zone, based on correlation to the Antelope Creek Ute Tribal 04-03 well Type Log. Additional impermeable lacustrine shale beds above the Confining Zone provide for further protection for any overlying USDW.

Injection Zone: The Injection Zone at this well location is an approximately 1989 ft section of multiple lenticular sand units interbedded with shale, marlstone and limestone from the base of the Confining Zone at 4070 ft (KB) to the top of the Basal Carbonate Formation at 6020 ft (KB), based on correlation to the Antelope Creek Ute Tribal 04-03 well Type Log.

Well Construction: The CBL shows only 65% pipe amplitude bond through and beyond the confining zone.

Surface casing: 8-5/8" casing is set at 270 ft (KB) in a 12-1/4" hole, using 200 sacks cement circulated to the surface.

Longstring casing: 5-1/2" casing is set at 6180 ft (KB) in a 7-7/8" 6180 ft Total Depth hole with a plugged back total depth (PBSD) of 6080 ft, cemented with 435 sacks cement.
Top of Cement (TOC): 1085 ft (KB) CBL.

Perforations: top perforation: **4528 ft** Bottom perforation: **5251 ft**

Wells in Area of Review (AOR): Construction and cementing records, including cement bond logs (CBL) as available, for two wells in the 1/4 mile AOR that penetrated the confining zone were reviewed and found adequate to prevent fluid movement out of the injection zone and into USDWs.

Well: Ute Tribal No. 16-06 ●

Casing Cement top: 3144 ft (CBL)

Well: Ute Tribal No. 16-08 ●

Casing Cement top: 2408 ft (CBL)